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Outcomes of Renal Transplantation for Recipients With Lupus Nephritis: Analysis of the Organ Procurement and Transplantation Network Database

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Prior analyses of transplant outcomes in lupus transplant recipients have not consisted of multivariate analyses in the modern immunosuppressive era. Here, we compared patient and graft outcomes in lupus and non-lupus recipients transplanted between 1996 to 2000 using the United Network of Organ Sharing/Organ Procurement Transplant Network database. We evaluated the impact of recipient and donor demographic factors, time on dialysis and the initial immunosuppression regimen on rejection rates and transplant outcomes. Univariate analysis showed similar graft but better patient survival rates for primary lupus and non-lupus transplant recipients (5-year patient survival rates for lupus cohort 85.2% for deceased donor transplants and 92.1% for living donor transplants as opposed to 82.1% and 89.8% respectively for the non-lupus cohort; $P=0.05$ and 0.03) but similar patient survival rates for deceased donor retransplant patients. After controlling for confounding factors, no differences in patient or graft survival were seen between the two groups. No difference in acute rejection rates were observed in deceased donor transplants, but there was a small but significant increase in the risk of acute rejection in living donor lupus transplant recipients (hazard ratio=1.19, $P=0.05$). Risk of graft failure was lower for deceased donor recipients receiving MMF (five-year graft loss rate=29.6% for MMF vs. 40.2% for those not receiving MMF, $P<0.0001$), but no differences were seen among living donor recipients. Outcomes were similar regardless of type of calcineurin inhibitor, induction therapy, and time on dialysis. We conclude that lupus transplant recipients have outcomes generally equivalent to non-lupus transplant recipients.

Keywords: Kidney transplant, Lupus, Graft survival, Outcome.

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Fifteen percent of patients with lupus nephritis (LN) progress to end-stage renal disease (ESRD) (*1*). Prior to 1975, patients with lupus nephritis were generally not offered renal transplantation due to the belief that the underlying immune complex disease would lead to recurrent glomerulonephritis and accelerated rejection in the allograft. These concerns about poor kidney allograft survival in systemic lupus erythematosus (SLE) patients were allayed by a joint report by the American College of Surgeons and the National Institutes of Health Renal Transplant Registry in 1975 that showed that renal transplantation was a feasible option for patients with ESRD due to LN (*2*). Since 1975, several studies have compared outcomes between lupus transplant recipients and nonlupus transplant recipients (*3–8*). The limitations of these studies are that many were from a single center and none of them accounted for differences in patient demographics and pretransplant risk factors. These confounding factors could have explained any differences or similarities in outcomes. A previous multivariate analysis of patients from the United States Renal Data System from 1987–1994 revealed similar patient and graft survival after first deceased donor and first living-related transplantation between lupus recipients and recipients with ESRD due to other causes (*9*).

Since 1994, novel immunosuppressive therapies, including antibody induction therapy (thymoglobulin or interleukin-2 receptor antagonists) and mycophenolate mofetil (MMF), have further enhanced transplant outcomes. No large studies have included these newer immunosuppressive therapies in their analyses. Furthermore, no studies have sufficiently analyzed rates of acute rejection (AR) in patients with ESRD caused by LN to determine if LN is an independent risk factor for acute rejection. In addition, no previous studies have analyzed the impact of LN on transplant out-

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comes in cases of re-transplantation. In this study, we reviewed the United Network for Organ Sharing (UNOS) renal registry database to compare the outcomes of renal transplantation between patients with ESRD caused by LN to patients with ESRD due to other causes. Graft survival, patient survival, functional graft survival (graft survival censoring patient death as a cause of graft loss), and rates of acute rejection within one year posttransplant were compared. Among patients with ESRD caused by LN, we assessed the significance of MMF, the type of calcineurin inhibitor used (tacrolimus or cyclosporine), and time on dialysis prior to renal transplantation on transplant outcomes.

METHODS

In this study, we reviewed data from the UNOS renal registry database from 1996 to 2000. Graft survival, patient survival, functional graft survival, and rates of acute rejection were compared in patients with ESRD due to lupus versus ESRD due to other causes. Deceased donor transplants were analyzed separately from living donor transplants. A separate analysis was performed for cases of retransplantation.

Statistical Analysis

Patient demographic data were compared using Wilcoxon rank-sum tests for continuous variables and Chi-square tests for categorical variables. Missing data were imputed with modal values for categorical variables and mean values for continuous variables. In addition, continuous variables such as age, cold ischemia time, duration of dialysis, and percent peak value of panel reactive antibodies (PRA) were categorized. Data on age, sex and race of the recipient, race of the donor, number of previous transplants, trauma as a cause of donor death, and cold ischemic time were complete. For patients who received deceased donor transplant, data on panel reactive antibodies was missing for 972 patients (2.22%); data on HLA-DR was missing for 1,502 patients (3.43%); data on cytomegalovirus (CMV) antibody status was missing for 1,543 (3.52%); data on MMF was missing for 5,865 (13.38%); and data on induction therapy was missing for 5,865 (13.38%). The proportions of patients missing data did not differ between the lupus and nonlupus cohorts. For patients who received a living donor transplant, data on donor age were missing for only two patients; data on PRA percentage was missing for 1,072 patients (4.87%); data on HLA-DR status was missing for 758 patients (3.44%); data on CMV status was missing for 1,953 patients (8.87%); data on immunosuppressive medications was missing for 2,581 patients (11.72%); and data for induction therapy was missing for 2,581 patients (11.72%).

Kaplan-Meier product limit method for univariate analysis was used to calculate survival probabilities for graft survival, patient survival, and functional graft survival. For patient survival analyses, patients who had not died were censored on December 31, 2003.

Multivariate Cox proportional hazards regression models were developed and used to calculate adjusted risk estimates for graft failure, patient mortality, and functional graft failure. Multiple logistic regression was used to model the rate of acute rejection within 1 year posttransplant. In the analysis of deceased donor transplants, control variables included recipient age, recipient gender, recipient race, donor age, donor gender, donor race, year of transplantation, number of previous transplants, percentage of PRA, HLA-DR mismatches, CMV status, use of induction therapy, use of MMF, presence of delayed graft function, history of donor death due to trauma, cold ischemia time, and duration of dialysis prior to transplantation. All of these factors except cold ischemia time and trauma as a cause of donor death were also included as potential confounders in the analysis of living-donor transplants.

The role of MMF, the type of calcineurin inhibitor used, and time on dialysis prior to renal transplant were also investigated in the lupus cohort. The Kaplan-Meier product limit method was used to calculate and compare graft survival, patient survival, and functional graft survival between: 1) patients who received MMF vs. patients who did not receive MMF, 2) patients who received tacrolimus vs. those that received cyclosporine, and 3) patients who were transplanted within one year on dialysis vs. those that were on dialysis for more than one year. Cox proportional hazards modeling techniques were used to estimate the risk of graft failure, mortality, and functional graft failure, adjusted for other factors.

Results with a P value at or below 0.05 were considered statistically significant. All analyses were performed using STATA Statistical Software, Release 8 (College Station, TX: StataCorp LP).

RESULTS

A total of 43,821 deceased donor renal transplants (37,256 primary transplants and 5,395 retransplants) were performed between 1996 and 2000. Among these transplants 1,170 patients had ESRD due to LN and 42,651 had ESRD due to other causes. Those with ESRD due to LN were typically younger, more likely to be female, black or Hispanic, CMV antibody positive, had higher PRA, had a more prolonged cold ischemia time, and were less likely to have delayed graft function or had previous transplants (Table 1).

A total of 22,017 living donor renal transplants (19,394 primary transplants and 1,834 retransplants) were performed between 1996 and 2000. Among these transplants, 789 patients had ESRD due to LN. Analysis of living donor transplants generated similar findings compared to those of deceased donor transplants with the exceptions that lupus patients were more likely to receive MMF (84.7% vs. 80.6%) and lupus patients who received living donor transplants had an incidence of CMV seropositivity similar to the nonlupus cohort.

Outcomes of Transplantations

Deceased Donor Renal Transplantation

For primary deceased donor renal transplants, patients with ESRD due to LN had similar one-, three-, and five-year unadjusted graft survival rates compared to patients with ESRD due to other causes (Table 2). For deceased donor retransplants, unadjusted one-, three-, and five-year graft survival rates were better for patients with ESRD due to LN (89.5% vs. 86.3%, 81.3% vs. 74.9%, and 74.5 vs. 63.5%, $P=0.03$).

Unadjusted one-, three-, and five-year patient survival

TABLE 1. Demographics of patients with end-stage renal disease due to lupus nephritis and other causes

	Cadaveric					Living donor				
	Lupus nephritis		Other causes			Lupus nephritis		Other causes		
	n	%	n	%	*P* value	n	%	n	%	*P* value
n	1,170	100	42,651	100		789	100	21,228	100	
Transplant year										
1996 to 1997	482	41.2	16,453	38.6	0.087	275	34.9	7,244	34.1	0.73
1998 to 2000	688	58.8	26,198	61.4		514	65.2	13,984	65.9	
Recipient age										
<21	54	4.6	2,214	5.2	<0.0001	64	8.1	2,703	12.7	<0.0001
22–60	1,063	90.9	34,149	80.1		718	91.0	16,495	77.7	
>60	53	4.5	6,288	14.7		7	0.9	2,030	9.6	
Recipient sex										
Male	204	17.4	26,186	61.4	<0.0001	149	18.9	12,589	59.3	<0.0001
Female	966	82.6	16,465	38.6		640	81.1	8,639	40.7	
Recipient race										
White	440	37.6	24,502	57.4	<0.0001	399	50.6	14,706	69.3	<0.0001
Black	480	41.0	10,776	25.3		189	24.0	2,957	13.9	
Hispanic	166	14.2	4,232	9.9		146	18.5	2,424	11.4	
Other	84	7.2	3,141	7.4		55	7.0	1,141	5.4	
Donor age										
0–20	336	28.7	11,581	27.2	0.086	31	3.9	547	2.6	0.060
21–55	707	60.4	25,524	59.9		703	89.2	19,074	90.0	
>55	127	10.9	5,517	12.9		54	5.9	1,566	7.4	
Donor race										
White	854	73.0	32,699	76.7	0.0020	423	53.6	15,021	70.8	<0.0001
Black	129	11.0	4,665	10.9		176	22.3	2,798	13.2	
Hispanic	152	13.0	4,167	9.8		145	18.4	2,432	11.5	
Other	35	30	1,120	2.6		45	5.7	977	4.6	
Previous transplants										
None	1,071	91.5	37,256	87.4	<0.0001	755	95.7	19,394	91.4	<0.0001
One	88	7.5	4,594	10.8		31	3.9	1,617	7.6	
>One	11	0.9	801	1.9		3	0.4	217	1.0	
Panel reactive antibodies (%)										
0–10	586	51.1	30,955	74.2	<0.0001	544	71.4	17,255	85.5	<0.0001
11–30	149	13.0	4,312	10.3		70	9.2	1,497	7.4	
31–100	413	36.0	6,434	15.4		148	19.4	1,431	7.1	
HLA-DR/haplotype mismatches										
Unknown	195	17.1	5,894	14.3	0.086	132	17.4	2,721	13.3	0.011
0	239	21.0	8,499	20.6		117	15.5	3,394	16.6	
1	436	38.3	17,055	41.4		406	53.4	11,292	55.1	
2	269	23.6	9,732	23.6		104	13.7	3,093	15.1	
CMV status										
Recipient+/Donor+	526	47.1	17,776	43.3	<0.0001	272	38.8	6,967	36.0	0.30
Recipient+/Donor−	284	25.4	9,328	22.7		165	23.5	4,406	22.8	
Recipient−/Donor+	176	15.7	8,083	19.6		105	15.0	3,124	16.1	
Recipient−/Donor−	132	11.8	5,973	14.5		160	22.8	4,865	25.1	
Received MMF										
No	165	16.5	6,399	17.3	0.72	105	15.3	3,637	19.4	0.001
Yes	834	83.5	30,558	82.7		583	84.7	15,111	80.6	

TABLE 1. Continued

	Cadaveric					Living donor				
	Lupus nephritis		Other causes			Lupus nephritis		Other causes		
	n	%	n	%	*P* value	n	%	n	%	*P* value
Induction therapy										
Unknown	20	1.7	377	1.0	0.16	3	0.4	73	0.4	0.95
No	719	60.5	22,329	60.4		507	73.7	13,520	72.1	
Thymoglobulin/OKT/ATG	226	19.0	6,595	17.9		42	6.1	1,291	6.9	
IL2 Antagonists	205	18.8	7,656	20.7		136	19.8	3,864	20.6	
Delayed graft function										
No	799	67.1	10,177	58.6	<0.0001	330	87.5	8,394	84.5	0.16
Yes	391	32.9	7,190	41.4		47	12.5	1,495	15.1	
Trauma as a cause of donor death										
No	599	51.2	21,618	50.7	0.74	NA		NA		
Yes	571	48.8	21,012	49.3						
Cold ischemia time										
0–14	286	24.4	12,485	29.3	0.001	NA		NA		
15–26	646	55.2	22,440	52.6						
>26	238	20.3	7,705	18.1						

TABLE 2. Unadjusted transplant outcomes comparing patients with end-stage renal disease due to lupus nephritis to patients with end-stage renal disease due to other causes

	Deceased donor			Living donor		
	Lupus	Other causes	*P* value	Lupus	Other causes	*P* value
Graft survival						
One year	88.6	88.7	0.652	94.2	93.6	0.729
Three years	77.4	78.5		87.5	87.7	
Five years	67.8	67.0		77.6	79.0	
Patient survival						
One year	94.4	94.3	0.046	98.5	97.6	0.027
Three years	88.8	88.8		96.4	94.4	
Five years	85.2	82.1		92.1	89.8	
Functional graft survival						
One year	91.2	91.6	0.0048	95.9	95.6	0.113
Three years	81.3	83.5		88.6	93.0	
Five years	71.5	73.7		80.8	83.2	
Retransplant graft survival						
One year	89.5	86.3	0.030	97.1	92.8	0.658
Three years	81.3	74.9		81.1	83.2	
Five years	74.5	63.5		66.8	74.8	
Retransplant patient survival						
One year	99.9	95.1	0.084	100	97.3	0.931
Three years	91.7	90.2		89.8	92.9	
Five years	90.3	84.1		85.7	88.7	
Retransplant functional graft survival						
One year	90.5	88.3	0.035	97.1	94.3	0.510
Three years	85.6	78.6		84.1	86.1	
Five years	79.7	68.1		69.2	78.7	

TABLE 3. Adjusted risk estimates for transplant outcomes of patients with ESRD due to lupus nephritis compared to patients with ESRD due to other causes

	Graft loss		Patient death		Functional graft loss		Acute rejection	
	Hazard ratio	*P* value	Hazard ratio	*P* value	Hazard ratio	*P* value	Odds ratio	*P* value
Deceased donor transplants	0.993	0.90	0.957	0.60	1.045	0.47	0.975	0.72
	(0.891–1.108)		(0.811–1.129)		(0.927–1.177)		(0.852–1.116)	
Living donor transplants	0.975	0.78	0.830	0.23	1.016	0.86	1.185	0.05
	(0.819–1.161)		(0.612–1.126)		(0.843–1.225)		(1.003–1.339)	

rates (Table 2) were slightly better for the lupus cohort ($P=0.05$). For deceased donor retransplants, patients with ESRD due to LN also had a trend toward better patient survival, although this was not statistically significant. (99.0% vs. 95.1%, 91.7 vs. 90.2%, 90.3% vs. 84.1%, $P=0.08$).

Functional graft survival rates for primary deceased donor transplants were slightly worse for patients with ESRD due to LN. Of these patients, one-, three-, and five-year functional graft survival rates were 91.2%, 81.3%, and 71.5% compared with 91.6%, 83.5% and 73.7% for those patients with ESRD due to other causes ($P=0.005$). However, for retransplants, lupus patients had better functional graft survival rates with a five-year rate of 79.7% compared with 68.1% for nonlupus patients ($P=0.04$).

Rates of acute rejection within one year of transplantation were similar in the lupus and nonlupus cohorts (35.2% vs. 34.0%, $P=0.42$).

Living Donor Transplantation

One, three-, and five-year graft survival rates were similar for patients with ESRD due to LN and patients with ESRD due to other causes in both living donor transplants ($P=0.73$) and retransplants ($P=0.66$) (Table 2).

One, three-, and five-year patient survival rates (i.e., 98.5%, 96.4% and 92.1% respectively) were higher for lupus patients compared to nonlupus patients (i.e., 97.6%, 94.4%, and 89.8% respectively; $P=0.03$). However, no significant difference in patient survival was observed between lupus patients and nonlupus patients who were retransplanted.

One, three-, and five-year functional graft survival rates were similar between the lupus and nonlupus cohorts ($P=0.11$). Similarly, no significant difference in functional graft survival was observed between lupus patients and nonlupus patients who were retransplanted ($P=0.51$).

Rates of acute rejection were significantly higher in patients with ESRD due to LN compared to patients with ESRD due to other causes (33.0% vs. 29.3%, $P=.03$).

Multivariate Analysis

For deceased donor transplants and for living donor renal transplants, female gender, donor age less than 20 years, and receiving MMF were associated with better graft, patient, and functional graft survival. Recipients who were older than 60 years of age, had previous kidney transplants, received a CMV positive transplant, had high PRA levels, received a kidney from a donor older than 55, and had two HLA DR antigen mismatches were associated with worse graft, patient, and functional graft survival rates. In deceased donor recipients, prolonged cold ischemia time (>26 hr) was associated with worse transplant outcomes, whereas trauma as a cause of donor death was associated with better outcomes. In addition, the risk of graft failure and functional graft failure was higher for black recipients. Receiving induction immunosuppressive therapy did not have a significant impact on graft survival or patient survival.

The likelihood of acute rejection for living and deceased donor transplants was greater with earlier transplants (1996–1997), black race, high PRA, primary transplants, donor age greater than 55, and two HLA DR mismatches. In contrast, recipients that were female, more than 60 years old, received induction immunosuppressive therapy, or had a donor less than 20 years old were less likely to experience acute rejection.

While the outcomes in the univariate analysis suggested better graft survival for lupus deceased donor recipients and better patient survival for lupus living donor recipients, the adjusted hazard ratios indicated no significant differences in these outcomes between the two groups (Table 3). There was, however, a small difference in acute rejection rate within one year of transplantation in the living donor population between lupus and nonlupus recipients (OR=1.19; $P=0.05$).

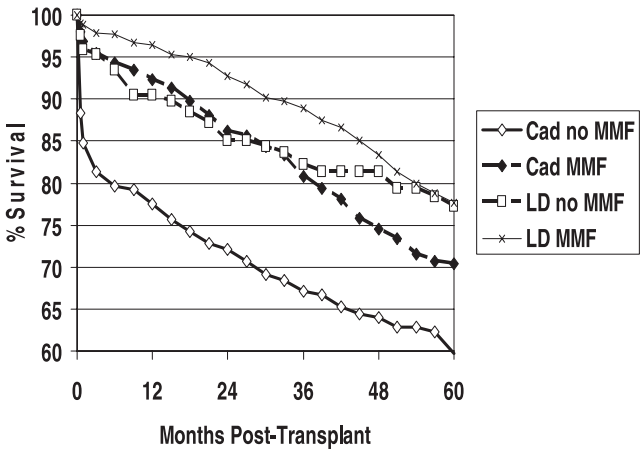

FIGURE 1. Graft survival curve for lupus patients who received MMF vs. those that did not receive MMF. Cad no MMF, cadaveric transplant lupus recipients who did not receive MMF at discharge. Cad MMF, cadaveric transplant lupus recipients who received MMF at discharge. LD no MMF, living donor transplant lupus recipients who did not receive MMF at discharge. LD MMF, living donor transplant lupus recipients who received MMF at discharge.

No difference in acute rejection rate was observed in deceased donor renal transplants.

Mycophenolate Mofetil

Deceased donor lupus transplant recipients had significantly better one-, three-, and five-year graft survival (Fig. 1, Table 4) compared with patients who did not receive MMF (92.3% vs. 77.5%, 80.8% vs. 67.1%, and 70.4% vs. 59.8%, $P<0.0001$). However, no difference was observed in living donor transplant recipients. After controlling for several other factors, the risk of graft failure remained lower (HR= 0.76; $P=0.020$) for recipients on MMF compared to those who did not receive MMF.

Tacrolimus vs. Cyclosporine

Lupus transplant recipients receiving tacrolimus or cyclosporine seemed to have similar transplant outcomes according to the unadjusted results. Multivariate analyses also indicated no significant differences in transplant outcomes for deceased and living donor lupus transplant recipients.

Time on Dialysis

Time on dialysis prior to transplant did not seem to significantly impact transplant outcomes. Patients had similar one-, three-, and five-year graft survival whether they received a preemptive renal transplant within one year when compared to those transplanted after one year of starting dialysis. Results from the multivariate analyses were commensurate with the unadjusted findings. We also did not find any difference in graft survival associated with no dialysis versus dialysis (HR 0.90 with 95% CI 0.60–1.36) or preemptive dialysis versus more than five years on dialysis (HR 1.13 95% confidence interval of 0.81–1.58) (Table 5).

DISCUSSION

In the report from the 1975 ASC/NIH Renal Transplant Registry, functional graft survival of recipients with lupus nephritis at an average follow-up of two years was 55% and patient survival was only 66%. With recent advancements in immunosuppressive therapies and with better therapies for active lupus, LN as a cause for ESRD no longer portends such a poor outcome. In our study, five-year graft survival in the lupus cohort was 68% for deceased donor recipients and 78% for living donor recipients. Five-year patient survival in the lupus cohort was 85% for deceased donor recipients and 92% for living donor recipients. In addition, while recurrence rates for lupus nephritis in the allograft has been reported to be approximately 30%, lupus as a cause of graft loss is only about 2–3% (*7*, *10*). This is likely explained by the fact that patients with recurrent LN have a less active form of the disease if it recurs (class II, III or V).

This analysis of large-scale registry data demonstrates that patients with ESRD due to LN have similar graft, patient, and functional graft survival rates compared to the general transplant population. While univariate analysis showed better graft survival rates for lupus recipients who received deceased donor renal transplants, this difference is likely related to the differences in patient characteristics such as age, gender, and lower incidence of delayed graft function. When adjusting for these and other factors, graft survival was similar between lupus and the nonlupus cohorts for both deceased donor and living donor transplants.

In our study, we showed that lupus patients who received deceased donor retransplants had slightly better graft survival than nonlupus patients who received deceased donor retransplants. However, no differences were observed be-

TABLE 4. Impact of mycophenolate mofetil, type of calcineurin inhibitor, and pretransplant dialysis time on graft survival

	Deceased donor			Living donor		
	MMF	No MMF	*P* value	MMF	No MMF	*P* value
Graft survival			<0.0001			0.471
One year	92.3	77.5		96.4	90.4	
Three years	80.8	67.1		88.8	82.2	
Five years	70.4	59.8		77.7	77.2	
	Tacrolimus	Cyclosporine	*P* value	Tacrolimus	Cyclosporine	*P* value
Graft survival			0.060			0.54
One year	92.7	89.7		95.3	95.8	
Three years	81.2	78.3		87.7	82.2	
Five years	73.1	67.9		80.1	78.5	
	Dialysis <3 months	Dialysis 3–12 months	Dialysis >1 year	*P* value	Dialysis <3 months	Dialysis 3–12 months	Dialysis >1 year	*P* value
Graft survival				0.317				0.487
One year	87.5	91.3	87.7		100	95.7	95.3	
Three years	84.0	82.1	76.1		93.5	88.2	87.4	
Five years	70.4	76.1	66.2		87.8	83.6	76.1	

TABLE 5. Hazard ratios (HRs) for graft loss, patient death and functional graft loss using Cox proportional hazards analysis of the lupus cohort

	Graft loss			Patient death			Functional graft loss		
	HR	95% CI	*P* value	HR	95% CI	*P* value	HR	95% CI	*P* value
MMF vs. no MMF (reference)	0.76	(0.61–0.96)	0.02	0.94	(0.65–1.36)	0.73	0.77	(0.60–0.98)	0.03
Tac vs CsA (reference)	0.93	(0.72–1.20)	0.56	0.80	(0.53–1.20)	0.28	0.99	(0.75–1.31)	0.95
Time on dialysis: >one year vs. <1 year (reference)	1.17	(0.89–1.55)	0.26	1.31	(0.83–2.08)	0.25	1.18	(0.87–1.60)	0.28

tween the lupus and nonlupus cohorts for living donor retransplantation. Therefore, lupus as the cause of ESRD should not influence consideration for retransplantation.

Among lupus patients, receiving MMF significantly improved deceased donor graft survival rates. Controlling for several known confounders, we demonstrated a 24% reduction in graft loss with the use of MMF. Censoring patient death as a cause of graft loss revealed a similar finding. Whether or not this improvement in graft survival is related to MMF's activity against recurrent LN remains to be seen. In our analysis, however, the overall transplant population had a 49% reduction in graft loss for deceased donor transplants and 41% reduction in graft loss in living donor transplants. Therefore, the beneficial effects of MMF in the lupus cohort do not appear to be related to MMF activity against SLE.

Receiving induction immunosuppressive therapy did not seem to improve graft survival or patient survival in lupus patients. In our multivariate models, no advantages in transplant outcomes were observed in the overall transplant population except for a 9% decrease in acute rejection within one year.

In lupus patients, there was no association between using tacrolimus or cyclosporine and transplant outcomes. This finding is similar to that of a recent registry data review of the overall transplant population (*11*). Pretransplant dialysis time also did not seem to affect transplant outcomes in the lupus cohort. This is in contradiction to the common practice that lupus patients undergo dialysis for at least one year before transplantation. This recommendation was based on a single-center study by Roth et al., in 1987 of 15 patients from the precyclosporine era, which revealed better graft function with longer pretransplantation dialysis (*12*). Subsequent studies have shown no association between length of dialysis and transplant outcome. Our study confirms no difference in transplant outcome with shorter pretransplantation dialysis. On the contrary, patients who were on dialysis for less than one year tended to have better transplant outcomes than those that were on dialysis for more than one year, although this was not statistically significant. Whether or not this finding applies to a subgroup with a high degree of lupus activity remains unclear, but renal transplantation for lupus patients should not be delayed solely because these patients have been on dialysis for less than one year.

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